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TRANSACTIONS
of
THE NEW YORK ACADEMY OF SCIENCES

SER. II, VOL. 7 FEBRUARY, 1945 No. 4

SECTION OF BIOLOGY[1]

JANUARY 8, 1945

DOCTOR T. C. BARNES, Associate Professor of Physiology, and DOCTOR R. BEUTNER, Professor of Pharmacology, Hahnemann Medical College and Hospital, Philadelphia, Pa.: *Electrical Pulsations in the Human Brain.*

(This lecture was illustrated by motion pictures.)

Electroencephalography is the study of electrical waves recorded through wires placed on the scalp. These waves are believed to come from the cerebral cortex, but deeper brain currents are known to spread upward to the electrodes as in subtentorial lesions. The normal frequency is 8 to 40 seconds and the normal voltage, 5 to 75 microvolts. The 10 per second waves are called *alpha;* slower, *delta;* and faster, *beta;* but they are the same waves at different speeds.

A one year old child has waves of less than 4 per second. Foetal brain waves have been recorded through the mother's abdominal wall and are similar to the central waves of the neonate. Electrical maturity is attained at the age of 12 in the visual or occipital regions. There is slight acceleration to the age of 18 in other areas. Brain waves of very aged patients are perfectly normal. Like Peter Pan, we never grow old. According to Golla, the occipital waves of women are faster than those of men, indicating that women are more keenly aware of their immediate surroundings.

[1] No meeting was held in January by the Section of Geology and Mineralogy.

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NOTE: This number contains the A. Cressy Morrison 1945 Prize Contest Announcement. (See Page 101.)

Some electroencephalographers claim that correlation exists between the frequency of brain waves and personality type. According to Saul and Davis, the fast type of brain wave indicates a dynamic personality; the slow type, a passive, dependent personality.

High alphas are statistically prone to asthma and ulcer. In schoolboys, what is considered a poor personality by the teacher is usually associated with slow waves. A high percentage of delinquent children have slow waves. Many physiologic conditions influence the brain waves, especially blood sugar. We have found a critical value of 130 mg. %. If a normal person has a blood sugar below this, hyperventilation will produce delta waves in most cases. Blood sugar should be taken with each electroencephalogram. The value, at the time of the test, is significant, for it indicates how much sugar is going to the brain. The sugar produces the energy of the brain and it may take place in the carbohydrate cycle yielding acetic acid, which combines with choline, forming acetylcholine.

We have produced artificial electrical brain waves by bringing acetylcholine into contact with brain extract. This work is a continuation of Dr. Beutner's life-long work on phase boundary potentials. This type of work has been completely neglected by neurophysiologists. For many years, oils, such as nitrobenzene, guaiacol, cresol, were used in the oil cell to test the electrical activity of drugs and hormones. In the last few weeks, we have succeeded in establishing a potential between acetylcholine and cholesterol. Cholesterol is an extract from the spinal cord, but cannot be used in its crystalline form. A solvent had to be found which, in itself, would give no electrical phase boundary with acetylcholine,—would dissolve cholesterol, conduct the current, have a density approximately that of water. After a long search, benzyl alcohol was found to satisfy these requirements, but it will not dissolve more than about 2% cholesterol. But this cholesterol gives a definite potential always negative with acetylcholine. It is known that activity of the brain waves probably arises from liberation of acetylcholine in the brain (stimulation of the petrosal nerve in the cat). Also the slowing of the waves during hyperventilation may be ascribed to the alkalosis of acapnia. It is well known that the hydroxyl ion hydrolyzes acetylcholine. During hyperventilation, the skin temperature also falls, indicating vasoconstriction with attendant cerebral ischemia.

In diagnosis the electroencephalogram is a valuable aid in the

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localization of cerebral tumors. At the Massachusetts General Hospital, their records show an accuracy of 85% in localization of cerebral tumors by the e.e.g. The e.e.g. is also very useful in the study of epileptics. In head injury, the e.e.g. will indicate if the brain has been damaged. In encephalitis, large smooth waves are found. The e.e.g. will also frequently detect malingering. Faked blindness and faked amnesia show normal e.e.g.s.

Stimulating drugs, like benzedrine and epinephrine, produce a slight increase in frequency, while pentothal and morphine slow the waves. Dilantin prevents the seizures of epilepsy and destroys the epileptiform waves. Luminal, on the other hand, has little effect on the e.e.g.

The e.e.g. is of value in our war effort. Even evacuation hospitals are now supplied with electroencephalographs. They are useful in determining when a serviceman with head injury can return to duty. In one case, a young sailor was found asleep at his battle station. The e.e.g. showed that he had sleeping sickness and so he was honorably discharged. At induction centers, the e.e.g., is useful in borderline cases, more so than in civilian life, owing to the attempts of some candidates trying to hide epilepsy and of others to fake pathologic conditions.

SECTION OF PSYCHOLOGY

JANUARY 15, 1945

DOCTOR CLARK L. HULL, Institute of Human Relations, Yale University, New Haven, Conn.: *Moral Values, Behaviorism, and the World Crisis.*

Whatever else it may be, human conflict involves disagreements, and these disagreements, at bottom, concern values in general and moral values in particular. The present armed conflict and world crisis is a symptom, at least, of a moral and ethical breakdown on a huge scale. Why is it that men of various civilized cultures can agree on matters of pure science but not on concrete moral issues? The attempt to understand this great paradox naturally leads us to go back and reëxamine our basic moral and ethical principles, on the one hand, and our scientific procedures on the other.

At the outset of our examination of the problem, we encounter the question of the methodology according to which the investigation shall be conducted. The methodology of metaphysical speculation will be discarded at once, because of its historically demonstrated inability to mediate agreement among men. For similar reasons, religious dogmatism will also be passed by in our quest. Upon the whole, history shows that religion is about as likely to cause conflict as to prevent it. The methodology of pure science has, on the other hand, an excellent record of mediating agreement among the scientists of all civilized nations. For this reason, many people have felt that we should reëxamine the methodology of pure science, to see what possibilities it may offer for understanding the nature of this age-old problem.

It is at once clear that the problem before us concerns principles or theory, rather than fact. Accordingly, we turn for guidance in methodology first to physical theory or mathematical physics as the portion of scientific theory at present most perfectly developed. But here we find a world of jumping electrons, on the one hand, and of thermodynamic equations, on the other. It is a little hard to see how an electron could, as such, have any moral obligation to jump in one direction rather than another. Similarly, it is equally hard to attach any moral significance, as such, to the flowing of heat from a point of high to a point of low temperature.

And so we might pass through the sciences, examining them one by one for light on the problem of moral conduct. It is evident that, somewhere in this hierarchy of the sciences, we encounter the phenomena of value in general and of moral value in particular. These phenomena will hardly be found in the theory of heavy water, for example, but they surely appear somewhere among the biological or behavioral sciences, certainly below the level of cultural anthropology. It is my opinion that ordinary food or "gut" values (incipient economic valuative phenomena) have clearly appeared at the level of lower mammalian behavior (e.g., the albino rat), and that moral valuative phenomena have definitely appeared at the level of normal human behavior and possibly, to a small degree, among the higher anthropoids.

Since economic values are theoretically considerably simpler and less charged with prejudice than are moral values, let us glance at them first. Within the last twenty years the more important basic molar laws whereby organisms come to value, i.e., strive for, certain objects, substances, or conditions, have gradually become fairly clear. In general, any act which is performed shortly before the reduction of a primary need, like that concerned with food, water, pain, optimal temperature, or sex, will be conditioned in such a way that when the organism is again in that situation or one resembling it, and suffers from that need or one resembling it, that act will tend to be evoked. This seems to be the basic molar law of conditioning or learning.

After habits have been set up in this manner, the organism, when suitably motivated, will exert itself, i.e., will strive, not only to attain food but to attain a state of affairs which will *lead* to food either directly or indirectly. The consumption of physiological energy in the pursuit of such goals or ends may accordingly be characterized as *work* or *striving*. Thus, generally speaking, that may be said to be valued which is striven for and, other things being equal, the maximum amount of work which an organism will execute to attain a given reinforcing state of affairs may be taken as an indication of the valuation of that state of affairs by that organism. Here, then, we have the basis, not only for an experimental science of value, but also for a theoretical science of value.

In this connection, there may be recalled the relationship mentioned a little while ago between value theory and scientific theory. For this reason, I shall pause briefly to remind you of the characteristic methodology of scientific theory.

1. Scientific theory sets out with a set (a) of concepts, and (b) of principles or hypotheses derived in one way or another from observation of one kind or another.

2. These are organized into a set of definitions and postulates; the latter, especially, in an ideal development, taking the form of equations.

3. If, then, a given set of observable dynamic conditions is assumed, and the principles of the system really apply to them, it is merely a matter of mathematical manipulation of the postulational equations to tell what will be the outcome of the situation in question.

4. If, now, an actual dynamic situation such as was assumed is encountered, or is set up experimentally, and if it (the situation) unfolds, as the theory has implied, we may say that the theory has acquired an increment of verification or substantiation and, in so far, is *true*. If, on the other hand, the empirical outcome is different from that predicted by the theory, the latter may be said, in so far, to be *false*. This comparison of deductive prediction with fact is known as *validation*, and is an absolutely indispensable part of pure science.

The procedure thus briefly outlined amounts to an operational definition of scientific theoretical truth.

It is quite clear from the above summary statement of scientific methodology that there is no *a priori* impossibility of ultimately attaining a molar theory of organismic behavior which will cover all aspects of the striving of organisms. Moreover, it is equally clear that such a theory, when worked out, will be capable of being proved valid or invalid by the empirical test of observing what really happens, following the occurrence of any dynamic conditions to which the theory applies.

Now, it is but a step from this to a theory of behavior which will enable us to predict, on the average, what *human* organisms will do under all sorts of conditions. It should even be possible, ultimately, to predict the verbal reactions which people make, i.e., what they will *say* regarding their approval or disapproval of the behavior of others as well as their own. Thus, the methodology of science, presumably, will ultimately apply to moral behavior, even including the *moral judgment*, since this is regarded as a bit of verbal behavior concerning people's approval or disapproval of *other* behavior.

But here we encounter a critical question, one concerning which there is a great deal of current confusion among both scientists and ethicists: Is the capacity of the methodology of pure science to mediate

the *prediction*, i.e., the logical deduction, of the occurrence under given conditions of behavior of whatever nature, whether moral, immoral, or neutral, the same thing as the capacity to *characterize* certain behavior absolutely as ethically good or bad?

As so often happens, the clear posing of a problem furnishes us with valuable clues to its solution. The clue in the case of the present problem is the distinction between *prediction* and *characterization*. No ethical system that I know about attempts to *predict* the occurrence of any event whatever.

Does this difference between ethical theory and the theory of moral behavior mean that ethical principles inherently can never have the type of validity that the scientific theory of moral behavior may have? I fear that the considerations just outlined leave us no alternative. So long as ethical theory only mediates the *characterization* of events if, or when, they occur, but never *predicts* the occurrence of anything, there can be no objective scientific test of its truth or falsity; i.e., there is no scientific means of determining its validity.

But statements which cannot be tested for truth or falsity cannot be said to be either true or false. This means that such statements occupy a scientific no man's land, which is practically equivalent to saying that such statements are scientific nonsense. This is, I think, the reason why men who are familiar with the techniques of science, by and large, are able, in the course of time, to attain substantial agreement in scientific matters, but as a rule make little progress toward agreement in regard to matters of moral conduct where serious concrete issues are involved. It follows that the so-called science of ethics, so far as *ultimate* ethical values are concerned, is a pseudo-science.* Meanwhile, this presents no impediment in the way of the development of a true science of moral behavior, including the moral judgment, because this is concerned with events which may be predicted and publicly observed. Neither does it impede the application of science in the determination of the most effective means of attaining values of all kinds, ethical or otherwise, as held by ourselves or others.

By much the same reasoning, it is concluded that the hope of somehow deriving ethical principles from the innate constitution of the "mind," on the analogy of the "self-evident" truths of logic and Euclid's approach to geometry, is also doomed to disappointment. This is be-

* It is to be noted that here the term *ethics* is employed in the technical sense of the alleged science of what absolutely *is* good or bad as distinguished from what particular individuals or cultural groups *say* is good or bad.

cause there probably is no such thing as a self-evident truth in Euclid's sense. The primary principles of logic and mathematics are believed to be those rules of reasoning (symbol manipulation) which have been found by trial to mediate valid (i.e., practically dependable or adaptive) conclusions. The formulation of these principles has taken centuries and is, by no means, complete even now. Thus, scientific theory requires for the derivation of valid theorems (1) sound scientific principles, and (2) sound logical rules for the mediation of the deductive process. Therefore, each empirically verified scientific theorem tends to validate both the scientific principles employed in its derivation and the logical rules whereby the scientific principles were transformed into the theorem. Thus, logical rules are validated in the same way, and indeed, at the same time, as are scientific principles. Accordingly, we conclude that the innate constitution of the "mind" also fails to yield a dependable basis for the validation of ultimate ethical principles.

SECTION OF ANTHROPOLOGY

JANUARY 22, 1945

DOCTOR WENDELL C. BENNETT, Associate Professor of Anthropology, Yale University, New Haven, Conn.: *Interpretations of Andean Archeology.*

In the Andean region of South America, archeological techniques and methods have been largely directed towards field recording and chronology. The aim of field recording is to preserve an excavation record for later analysis and interpretation. The ideal record would be one which allowed laboratory reconstruction of the plan of a grave, a temple, or a refuse site. The techniques employed for this are obviously not adaptable to broad cultural generalizations.

The emphasis on chronology has likewise led to the utilization of specialized forms of evidence. In fact, many of the archeological monographs omit such standard topics as grave type, architecture, weaving and metallurgy. For example, there was, to my knowledge, no published statement that the Nazca Period lacked significant architecture until 1944. This is not a criticism, since chronology is a basic need in Andean archeology. However, it is important to note clearly the unit being studied since chronology can be both cultural and regional. That is, an established chronology may represent a cultural continuum with change over time, or the successive periods of occupation of a specific region. It seems obvious that the potentialities of archeological studies of acculturation depend on having a cultural chronology.

Most Andean chronologies are regional in that they refer to sequences in sites, valleys, or departments. Further analysis and interpretation depends on the grouping of local sequences into larger regional units within which the component cultures and periods are interrelated. In other words, the concept of culture area is introduced, particularly that of Kroeber's "intensive" area, which represents "a substantial unit of historical development, or of a prevailing characteristic current of culture."

For example, the Central Andean region, that is, Coastal and Highland Peru and the altiplano of Bolivia, seems to meet the tests of an intensive culture area. At an early date, a basic pattern was es-

tablished which not only united the component cultures, but also persisted with sufficient strength to absorb and remold outside influences. This can be demonstrated in a number of ways. The intensive agricultural subsistence is a constant. Such domesticated plants as potatoes, corn, quinoa, manioc, beans, peanuts, and many fruits, are common to all of the cultures in spite of the fact that all the plants do not grow in any one local region. The domesticated llamas, alpacas, and guinea pigs are found everywhere, and the cultivation techniques always include the digging stick, irrigation, terracing, fertilizer, and crop rotation. The types of clothing and shelter show no great variation, and the arts and crafts show about the same development, even including some specific design elements, such as the ray fish, the feline, and the trophy head. In all periods, population concentration, class distinctions, religious organization, and political units above the local group, are implied.

In terms of the culture area concept, the greatest inconsistency in the unity of the Central Andes might seem to be the environment. All geographers emphasize the contrast of the desert coast and the high mountain plateaus and valleys. However, in terms of the common culture pattern outlined above, the environmental contrasts are not too great. In both the Highland and Coastal valleys, there are large areas suitable to digging stick cultivation; that is, areas without extensive forests, swamps, deep rooted grasses, and leached out soils. Although the topography is varied, there are no insurmountable barriers. In terms of travel by foot, a sand desert is about as difficult as a mountain trail. In fact, in cultural-geographical terms, there is a far greater contrast between the Central Andes, as a whole, and the grass covered Argentine pampas, the Amazonian tropical forest, the Chilean rain forest, and even the Ecuadorian paramos which are but little suitable to herding llamas and alpacas.

Granting that the Central Andes represents a valid intensive culture area, a relative chronology for the total region can be established. At the present time, there appear to be three generally pan-Central Andean horizons with intermediate local developments. In simplified form, these consist of an early Chavín horizon, a middle Tiahuanaco horizon, and a late Inca horizon. Between the Chavín and Tiahuanaco horizons are local "Early" Periods, such as Mochica on the North Coast, Nazca on the South Coast, and Recuay in the North Highlands. Between the Tiahuanaco and Inca horizons are local "Late" Periods, such

as Chimu on the North Coast, Ica on the South Coast and Decadent Tiahuanaco in the South Highlands. The Spanish Conquest marks the upper time limit of the Inca horizon.

An intensive culture area with its relative chronology can be subjected to various types of analysis. One may start with the contemporary Indians of Peru and Bolivia and trace aspects of their culture back through the historical accounts of the Inca into the archeological past. In such a way, new significance is given to much of the archeological interpretation. Likewise, trends of development within the area can be examined. It can be seen that art styles change from realistic in the Early Periods, through stylization in the Middle Periods, to geometric in the Late and Inca Periods. Habitation patterns can be seen to change from small villages to extended cities, implying at the same time a marked increase in population. Technological trends can be examined. For example, the weaving shows no significant technological advancement, but rather changes due to local preferences for designs and techniques, while the metallurgy shows a developmental technological sequence.

Studies of the culture areas of North America have shown that the component groups may still differ markedly from each other. This seems equally true in the Central Andes, even within the same relative time horizon. Such differences do not seem to be due to lack of contact with other groups in the area, but rather to distinct patterns of cultural orientation, particularly reflected by the leisure time activities of the population. In the Central Andes, leisure time above the economic requirements of food, shelter, clothing, and protection was undoubtedly available for some or for all of the population. Archeologists cannot analyze all patterns of utilization of such leisure time, but some suggestions are possible through examination of evidence of wealth concepts, sharp class differences, religious enrichment, public work projects, and the like. Two periods are discussed (and illustrated) as samples: the Nazca-Paracas on the South Coast, and the Mochica on the North Coast. Both are roughly contemporaneous and the coastal environment is about the same.

The Nazca and the Necropolis Period of Paracas are closely related and are treated here as a unit. As such, the materials are found in the Nazca, Ica and Pisco Valleys, all of which are limited in cultivable soil, so that the absolute size of the population was never great. There is no evidence of large scale buildings, pyramids, or

public work projects which would indicate organized mass labor. Metallurgy is limited to hammered gold objects, but ceramics are well developed, and decorated with polychrome designs, representing ornate and elaborated religious figures.

Textile weaving for burial purposes is the outstanding development. Large mummy bundles are found which contain innumerable pieces of finished cloth. Such pieces show none of the usual signs of wear from use in daily life, and many are made for the size of the bundle rather than for the size of the living. Weaving requires a great amount of time, when all factors are considered, such as trade for raw materials, spinning, dyeing, the actual loom weaving, and embroidery finish. The technical standards are high and still it is evident that large numbers of weavers were able to meet these standards. One is impressed by the number of man hours of labor directed, not towards the living, but rather towards the glorification of the dead.

In brief, there is little archeological evidence for marked class distinctions, organized labor patterns, highly formalized religious or political institutions. The Nazca-Paracas pattern might be described as a grave-oriented use of leisure time.

The Mochica Period is centered in the Viru, Moche, and Chicama Valleys, but spreads beyond these in two directions. Many large pyramids and other public works suggest organized mass labor. Weaving is little developed, or at least it has not been preserved, although ceramic designs indicate weaving under supervision. The grave contents are largely ceramics, the manufacture of which does not represent the same time factor as does the hand weaving of textiles.

The ceramic designs suggest rather marked class distinctions. These are demonstrated by scenes of swimmers towing a man on a raft, honored guests being served by menials, and individuals carried in litters. There is evidence of many specialized groups, such as runners, priests, and warriors. The ceramic designs also indicate an interest in worldly things by faithful portrayal of plants, animals, scenes of hunting, fishing, and warfare, and diseases and punishments. In general, the Mochica pattern suggests that leisure time led to class distinctions and corvée labor.

Archeological observations on these two patterns can be made historically. The Tiahuanaco style, which marked the Middle Period time horizon, mixed readily with the Nazca. The potters made vessels, with new shapes and designs. The weavers turned to ambitious tapes-

tries, but still designated for the grave. Tiahuanaco style did not mix with Mochica, but rather replaced it, or, more likely, drove it temporarily to the north. Furthermore, the Nazca pattern did not expand geographically but remained limited to three valleys. The Mochica, on the other hand, spread over seven valleys, and its influence is noted in the North Highlands, and on the Central Coast.

The Nazca pattern disappeared with the Tiahuanaco, never to be reformulated. The Ica Late Period on the South Coast has been called "Late Nazca" only because of the valley in which it is found, but its ceramics, buildings, and weaving show practically no influences from the earlier pattern. The Mochica pattern, however, persisted, in spite of local interruption by Tiahuanaco. The Chimu Late Period is an extension of the earlier Mochica. The question of this relationship has never been raised; the problem, rather, is to express it.

It is interesting to speculate that the persistence of Mochica may have been due to the corvée labor patterns. Ruth Benedict has suggested that, wherever the American Indians have survived in numbers up to the present time, the old political patterns were based on corvée labor. The Mochica pattern seems a case in point.

SECTION OF PHYSICS AND CHEMISTRY

JANUARY 26 AND 27, 1945

Conference on *"Surface Active Agents."*

The Section of Physics and Chemistry held a Conference on "Surface Active Agents," as the third in the series for the Academic Year 1944–1945. Doctor M. L. Anson, Continental Foods, Inc., Hoboken, New Jersey, was the Conference Chairman in charge of the meeting.

The program consisted of the following papers:

"Introductory Remarks," by M. L. Anson.

"The Structure and Properties of Solutions of Colloidal Electrolytes," by A. W. Ralston, Armour Laboratories, Chicago, Illinois.

"Surface Active Agents at Interfaces," by Earl K. Fischer and David M. Gans, Interchemical Corporation Research Laboratories, New York, N. Y.

"Certain Aspects of the Chemistry of Surface Active Agents," by Donald Price, Interchemical Company, New York, N. Y.

"Properties Involving Surface Activity of Solutions of Paraffin Chain Salts," by Leo Shedlovsky, Colgate-Palmolive-Peet Company, Jersey City, New Jersey.

"Surface Active Agents in Biology and Medicine," by E. I. Valko, Onyx Oil and Chemical Company, Jersey City, New Jersey.

"The Nature of the Bacteriacidal Action of Surface Active Agents," by Rollin D. Hotchkiss, Rockefeller Institute for Medical Research, New York, N. Y.

"Surface Active Agents in Industry," by R. R. Ackley, Mellon Institute, Pittsburgh, Pennsylvania.

"Surface Active Agents in Ore Flotation," by M. D. Hassialis, School of Mines, Columbia University, New York, N. Y.

THE NEW YORK ACADEMY OF SCIENCES

announces

THE A. CRESSY MORRISON PRIZE CONTEST FOR 1945

Two prizes of $200. each, offered by Mr. A. Cressy Morrison, to be known as the A. Cressy Morrison Prizes in Natural Science, will be awarded at the Annual Dinner, December, 1945, for the two most acceptable papers in a field of science covered by the Academy or an Affiliated Society.

CONDITIONS:

(1) Eligibility. Authors and coauthors shall be members in good standing of The New York Academy of Sciences or one of the Affiliated Societies, prior to submission of the manuscript.

(2) Date. Papers are to be submitted on or prior to **October 1, 1945**, to the Executive Secretary of The New York Academy of Sciences, at The American Museum of Natural History, Central Park West at 79th Street, New York, N. Y.

(3) Papers. All papers submitted must embody the results of original research not previously published. The manuscript shall be typewritten, in English, accompanied by all necessary photographs, drawings, diagrams and tables, and shall be ready for publication. Papers must be accompanied by a summary of the data presented and conclusions reached.

(4) Awards. The awards shall be made by the Council of The New York Academy of Sciences. If, in the opinion of the judges, no paper worthy of a prize is offered, the award of a prize or prizes will be omitted for this contest.

(5) Publication. The Academy shall have first option on the publication of all papers submitted, unless especially arranged for beforehand with the authors, but such publication is not binding on the Academy.

(6) Wherever and whenever published, the papers awarded the prizes shall be accompanied by the statement: "Awarded an A. Cressy Morrison Prize in Natural Science in 1945 by The New York Academy of Sciences."

Such statement in substance must also accompany any formal publicity initiated by the author regarding the prize paper. If published elsewhere, six copies of each prize paper must be deposited shortly after publication with the office of The New York Academy of Sciences.

THE NEW YORK ACADEMY OF SCIENCES,

Central Park West at 79th Street, New York, N. Y.

EUNICE THOMAS MINER,
Executive Secretary.

NEW MEMBERS

Elected January 25, 1945

LIFE MEMBER

Edison, Ann O., B.S., Pharmacology, Biophysics, Nutrition. In charge of Biophysics Department, Merck Institute for Therapeutic Research, Rahway, New Jersey.

SUSTAINING MEMBER

Elmendorf, Ten Eyck, M.D. Attending Pediatrician, St. Elizabeth Hospital; Director, Pediatrics, Seton Hospital; Consulting Pediatrician, Lutheran Hospital, New York, N. Y.

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Albaum, Harry G., Ph.D. Biochemist, Medical Research Laboratory, Edgewood Arsenal, Maryland.

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Bailey, Gladys W., M.S., Ornithology. Instructor, American Museum of Natural History, New York, N. Y.

Bond, W. L., M.S., Physics, Crystallography. Member, Technical Staff, Bell Telephone Laboratories, New York, N. Y.

Braddicks, Robert P., M.S., Physical Chemistry. Research Chemist, General Printing Ink Corporation, New York, N. Y.

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Cooper, Gerald R., Ph.D., Physical Chemistry in Medicine. Research Associate in Experimental Surgery, Duke University School of Medicine, Durham, North Carolina.

Cox, Herald R., Sc.D., Bacteriology. Associate Director, Virus and Rickettsial Diseases, Lederle Laboratories, Pearl River, New York.

Darken, Marjorie A., M.A., Plant Physiology, Antibiotics. Culture Biologist and Research Biochemist, Heyden Chemical Corporation, Princeton, New Jersey.

Davison, Mrs. Daniel F., M.A., Child Development. Work in Child Development, New York, N. Y.

Denton, J. J., Ph.D., Organic and Pharmaceutical Chemistry, Pharmaceutical Research Chemist, Calco Division, American Cyanamid Company. Bound Brook, New Jersey.

Dunham, Wolcott, B., M.D., Associate in Microbiology, The Squibb Institute for Medical Research, New Brunswick, New Jersey.

Erich, Walter, M.S. Organic Research Chemist, New York, N. Y.

Friedhoffer, Mollie, M.S., Micropaleontology. Assistant Technician, Department of Micropaleontology, American Museum of Natural History, New York, N. Y.

Gellhorn, Alfred, M.D. Assistant Professor of Pharmacology, College of Physicians and Surgeons, New York, N. Y.

Gingold, Jacob, Eng.D., Physics and Physical Chemistry. Head of Laboratory, General Ceramics and Steatite Company, Keasby, New Jersey.

Harmantas, Louis, M.S., Meteorology. Supervising Forecaster and Official in Charge, U. S. Weather Bureau, LaGuardia Field, New York.

Hauser, Arthur Armstrong, Jr., B.S., Projects Engineer, Sperry Gyroscope Company, Research Division, New York, N. Y.

Hausner, Henry H., D.E., Physics, Biology. Chief Research Engineer, General Ceramic and Steatite Company, Keasby, New Jersey.

Hyman, Herbert H., M.S., Physical Chemistry. Research Associate in Chemistry, Metallurgical Laboratory, University of Chicago, Chicago, Illinois.

Jablons, Benjamin, M.D., Physiology and Biochemistry. Associate Visiting Physician, Goldwater Memorial Hospital, New York, N. Y.

Jackson, Eleanor Alexander, Ph.D., Bacteriology. Research Fellow, Department of Public Health and Preventive Medicine, Cornell University Medical College, New York, N. Y.

Kaufman, Paul, M.D., Internal Medicine. Attending Physician and Research Worker, Goldwater Memorial Hospital, New York, N. Y.

Kaunitz, Hans, M.D., Experimental Medicine. Research Associate, Pathology, Columbia University, New York, N. Y.

Knox, James J., Chemistry and Physics. Research Chemist, Precious Metals Research, E. I. du Pont de Nemours Company, Arlington, New Jersey.

Lester, David, Ph.D., Biological Chemistry. Research Assistant in Applied Physiology; Assistant Professor, Yale University, New Haven, Connecticut.

Longenecker, Herbert Eugene, Ph.D., Biochemistry. Dean of Research in Natural Sciences; Professor of Chemistry, University of Pittsburgh, Pittsburgh, Pennsylvania.

Lowenstein, Otto, M.D., Neurophysiology, Clinical Neurology and Psychiatry. Clinical Professor of Neurology, New York University College of Medicine, New York, N. Y.

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